We sincerely thank the reviewers for their thoughtful, valuable and detailed comments and suggestions that have helped us improve the paper quality. Based on their comments, we have revised our manuscript carefully. Our detailed responses (Blue) to the reviewer's questions and comments (*Italic*) are listed below.

Reviewer #2 (Comments to Author):

The 2019 Australia mega fires have got great concerns by the science community. Sea land breeze (SLB) is a regional thermodynamic circulation closely related to coastal atmospheric environment yet few have looked into how it is influenced by different types of aerosols transported from either nearby or remote areas. By focusing on the 2019 Australia mega fire events, this study investigates this issue and found that SLB day number during the great fire month was only four, accounting for 33.3% of the multi-years' average. The land wind (LW) speed and sea wind (SW) speed also decreased by 22.3% and 14.8% compared with their averages respectively. Potential mechanisms how aerosols are transported here and affect the SLB through radiative cooling have been carefully analyzed and discussed. The findings are great contribution to the science community and definitely worthy for prompt publication after some necessary minor revisions.

We highly appreciate the reviewer's positive evaluation about the value of our study and invaluable comments. We made corresponding changes based on these comments as detailed below.

Minor points:

Could the author clarify the continuity of the observation data? Since the SLB day is selected based on certain rules, it seems to be necessary that the original data is continuous throughout the study period, then it is meaningful to compare each year's SLB day number.

Thanks for the valuable comment. We have checked the continuity of the data, including both the number of observation day and that of daily observation time. We now add the information at **Lines 193-196. 'The continuity of the observation data is ensured, there are observations on each day in January throughout the whole study period, with only one missing observation data at each day of a small fraction time (approximately 3.5%).'** The original time series are thought as generally continuous and are definitely suitable for SLB study. The total number of sample day was 620 (31*20), which means that there were observation records on each day of January from 2001 to 2020. As shown in Figure R1, the full daily observation time was eight with few days missing only one time of observation.

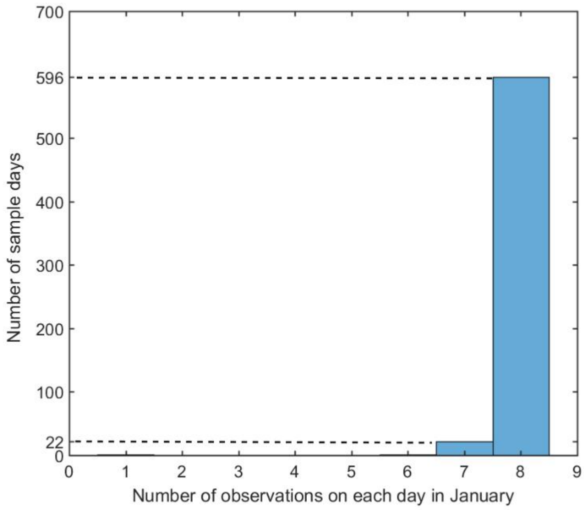

Fig. R1 The statistics on the number of sample days with different daily observation times.

Line 43-44, "There were" should be "There are"

Thanks for your careful proofreading. We have corrected it.

Line 50-51, "during different seasons" is suggested as "in different seasons"

Modified as suggested.

Line 60, "is" should be "was"

Corrected.

Line 83, "Shen et al., 2021; Shen et al., 2021;" should be "Shen et al., 2021a, b"

Corrected.

Line 155, remove "The" for "The Several types of data"

Corrected.

Line 164: Please modify the decimal number of the spatial resolution to keep them uniform in terms of resolution.

Thanks for the suggestion and we have made corresponding revision. Since the original version was '0.002349°×0.002349°', it is only appropriate to modify it to be '0.002°×0.002°'. We have also modified other spatial resolution to keep the decimal number uniform.

Line 159, please confirm it is GADS or GDAS?

It should be GDAS and we have corrected all wrong abbreviations.

Line 200-204, please confirm and make it consistent for the dataset name, GDAS, GADS, or GDADS?

Corrected.

Line 243-244, "time period" is suggested as "period"

Modified.

Line 330-331, "which is the direct cause of SW speed decrease" should be "which is the direct cause of decreased SW speed".

Corected.

Line 388-390, considering the importance of solar radiation, it is worthy for the authors to check the change of radiation there. If there are ground-based observation of radiation, that will be great. If there are not, the authors might check the CERES radiation data while it might have too coarse spatial resolution to make the analysis not possible or challenging. Anyway, it is worthy to check if there are suitable data and check if the radiation has the expected changes. Of course, even if there are no radiation data, that would not affect the analysis here by directly considering the variation of temperature and aerosols.

Thanks for the valuable comment. Unfortunately, there is no in situ observation at the site, cited by official stuff from Australia Weather Bureau, **'Clearly it would be impractical (not to mention exorbitantly expensive and labor intensive) to maintain high quality solar measurements at all locations across Australia. To circumvent this problem scientists (notably Dr. Gary Weymouth from the Bureau of Meteorology Research Centre) have developed a computer model using visible images from the geostationary meteorological satellites to estimate daily global solar exposures at ground level. To estimate the daily radiant exposure at each location, the images are averaged over at least four pixels and integrated over the entire day'**. (http://www.bom.gov.au/climate/austmaps/solar-radiation-glossary.shtml#globalexposure). Considering the lack of in situ observation, we choose to use CERES data to investigate the distribution of SDSR. The outcome is shown in Fig. R2.

Fig. 4 shows that there were obvious negative SW anomalies in 2008, 2011, 2015 and 2020, consistent with low levels of SDSR in these years at the site (Fig. R2). There were obvious positive SW anomalies in 2002, 2003 and 2018, with also high levels of SDSR at the site (Fig. R2). The increased SDSR in 2003 and 2018 may be caused by low level of cloud fraction and COD, whose influence should not be ignored in this proposed mechanism (**Fig. 10 & Lines 439-461**). We also note that there were some years when the radiation was high but the SW speed was not very high. For example, there was high SDSR in 2019 but SW speed was only a little higher than normal. Note that CERES data is partially based on model simulation and its spatial resolution is coarse. The model simulation takes aerosols into consideration but it cannot accurately record the vertical distribution and different types of aerosols. Usually, it is suitable to use it to investigate the large-scale distribution of radiation or seasonal variation of radiation over a large area. However, it might bring uncertainties to the radiation in terms of regional scale. Just take 2020 as an example, the AOD at the fire center was over 10 times than normal condition (Figs. 8-9), which should bring obvious changes to SDSR considering such an enormous release of absorbing aerosols. We do see that the SDSR at the fire center was at the low level in 2020. CERES generally reveals this phenomenon but it is similar as those in 2011, 2015 and 2016. In conclusion, CERES data have uncertainties to some extent, while the SDSR generally agrees well with the SW anomalies in Fig. 4.

In addition to potential observation support, we emphasized the physical mechanism of our analysis. The local cloud fraction and cloud optical depth (COD) were nearly at the average level, which ensures that the the increased absorbing and scattering effect brought by the aerosol burst would not be offset by significant cloud anomaly. Note that the exclusion of cloud's influence is important for the proposed mechanism. Consideration of this further makes our site as an ideal place to learn aerosols' effect on SLB. Importantly, the in situ SDSR is quite sensitive to the variation of AOD because of aerosol's direct effect [Turnock et al., 2015]. The AOD of total aerosol increased significantly during mega fires. Though we lack accurate in situ observation of SDSR due to several limitations as mentioned before, all of these ensure that the in situ SDSR should have negative anomaly and was linked to the SW decrease during mega fires from the aspect of physical mechanism.

Shen, L. X., Zhao, C. F., Yang, X. C.: Insight Into the Seasonal Variations of the Sea-Land Breeze in Los Angeles With Respect to the Effects of Solar Radiation and Climate Type, J. Geophys. Res.-Atmos., 126, 1-21, https://doi.org/10.1029/2019jd033197, 2021.

Turnock, S. T., Spracklen, D. V., Carslaw, K. S., Mann, G. W., Woodhouse, M. T., Forster, P. M., Haywood, J., Johnson, C. E., Dalvi, M., Bellouin, N., and Sanchez-Lorenzo, A.: Modelled and observed changes in aerosols and surface solar radiation over Europe between 1960 and 2009, Atmos. Chem. Phys., 15, 9477－9500, https://doi.org/10.5194/acp-15-9477-2015, 2015.

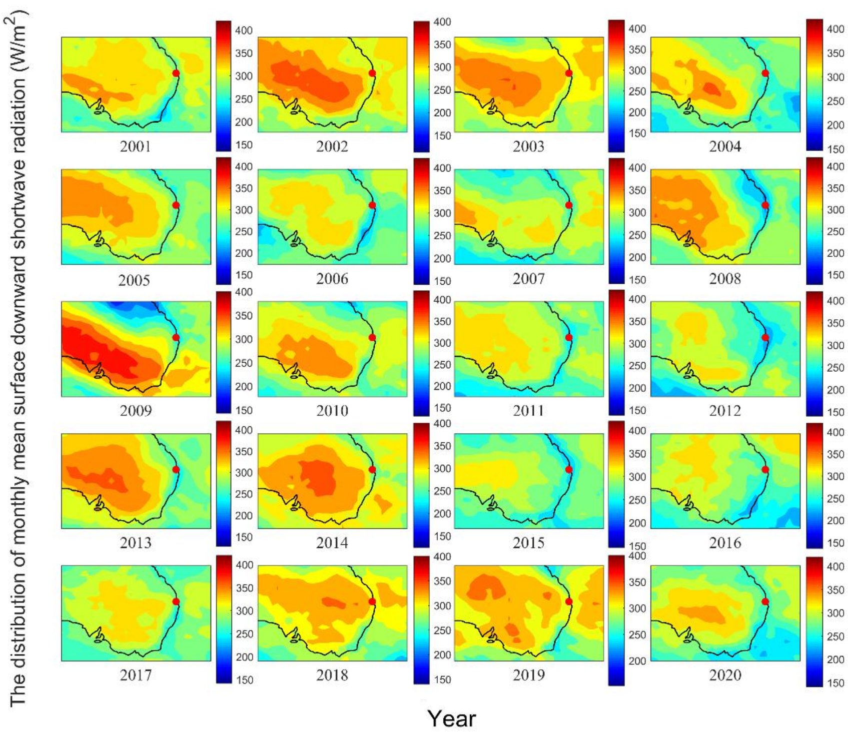

Fig. R2. The distribution of monthly mean surface downward shortwave radiation in January from 2001 to 2020 based on CERES data.

Line 619, remove "This" in "This In this study"

Corrected.